APPENDIX G

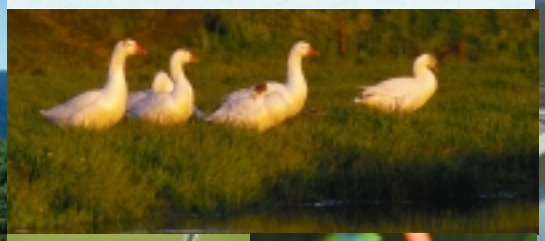
EXECUTIVE SUMMARY
OF
NAPA SANITATION DISTRICT
STRATEGIC PLAN FOR RECYCLED WATER USE IN THE YEAR 2020

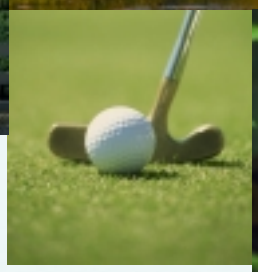
AUGUST 2005

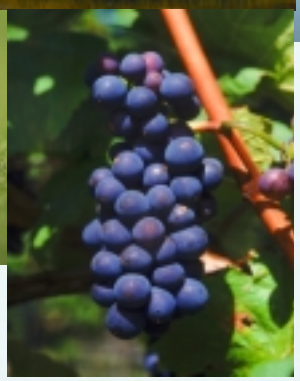
FINAL DRAFT

NAPA SANITATION DISTRICT

Strategic Plan for Recycled Water Use in the Year *2020*







prepared by

LARRY WALKER ASSOCIATES

Napa Sanitation District
Strategic Plan for Recycled Water Use in the Year 2020

Executive Summary

Background and Purpose

The Napa Sanitation District (District) owns and operates the Soscol Water Recycling Facility (WRF) south of the City of Napa. The facility has an average dry weather design capacity of 15.4 million gallons per day (mgd). Currently, treated wastewater is sent to the Napa River during the wet season (November 1 through April 30) and used for irrigation during the dry season (May 1 through October 31). During the dry season, wastewater is filtered and distributed to local vineyards, industrial parks, and golf courses. Recycled water produced at the Soscol WRF is "disinfected tertiary quality," the highest quality recognized under the Department of Health Services, Title 22 requirements.

Significant factors are prompting the District to consider expansion of its water recycling program. Principal benefits to the community would include the following:

- Assurance that the highest quality water is reserved for the highest quality use, public drinking water
- Decreased reliance on dwindling groundwater supplies
- Increased availability of recycled water for irrigation in water-short areas
- Prevention or postponement of costly water supply projects
- Enhancement of the Bay-Delta System by reducing dependence on the North Bay Aqueduct
- Broader rate base for the District with more recycled water users
- Reduction of emphasis on the National Pollutant Discharge Elimination System (NPDES) permit for river discharge and its associated costs and uncertainty

As a result, the District is exploring options to maximize recycling of wastewater produced at the Soscol WRF. To support this effort, a Strategic Plan for Recycled Water Use in 2020 was developed. This executive summary provides a brief description of the process and results for development of the Strategic Plan.

GROWTH AND INFLUENT FLOW PROJECTIONS

Growth and influent flow projections were based on predicted development in the District's service area in 2020. The Year 2020 was selected to correspond with the date estimated for build-out, as specified in the City of Napa General Plan. The following procedures were used to project an influent flowrate for 2020:

- Identification and review of population and business growth projections for the Napa area;
- Analysis of sewer connection data for the Napa Sanitation District;
- Determination of design conditions (the 2020 population and development predictions);
- Calculation of influent flowrates based on the design conditions; and
- Selection of a representative influent flowrate for 2020.

Population and Business Growth Projections

Population and business growth projections were estimated using scenarios presented in the City of Napa General Plan and the Association of Bay Area Governments (ABAG) Projections 2003. These population and business growth estimates were adapted to reflect the District's entire sewer service area (City of Napa, Airport/Industrial Area, and the Silverado Country Club Area). Using information on known (2003) District sewer connections and established conversions for number of persons per dwelling unit and square footage per commercial-industrial connections, the number of sewer connections in 2020 was estimated. The results of this analysis are summarized in **Table ES-1**.

Table ES-1. Number of Existing and 2020 Sewer Connections in the Napa Sanitation District Service Area

Growth Scenarios	Number of Sewer Connections			
	Residential		Commercial/Industrial/Other	
	Existing[1]	2020	Existing[1]	2020
City of Napa General Plan – Buildout Conditions	30,973	35,650	4,077	5,086 (10,381,162 sf)
ABAG 2020 Projection		36,342		4,835 (9,867,536 sf)

[1]Napa Sanitation District sewer connections in 2003.

Projected Influent Flowrates

Influent flowrates for the Soscol WRF in 2020 were estimated using winter water use data for residences and commercial/industrial facilities. Water use during the winter months (January and February) typically reflects the volume of water entering the sewer system. The water use data was obtained from the City of Napa Water Division.

The volume of wastewater generated by a particular source was then multiplied by the predicted number of sewer connections in 2020. The City of Napa General Plan was used as the representative growth scenario. It was determined to be the most predictive of growth in the Napa area through 2020. The Rural Urban Limit (RUL) delineated in the General Plan has remained unchanged since 1978 and the development predicted for the RUL has been in effect since 1994. The Napa community feels strongly about limiting development according to the RUL and General Plan, so this growth scenario was selected instead of the ABAG projections. Influent flowrates based on winter water use and General Plan build-out conditions are summarized in **Table ES-2**. The annual average influent flowrate in 2020 is projected to be 9.56 mgd, an 8% increase over the average influent flowrate of 8.83 mgd measured from 1998 to 2003.

Table ES-2. Projected Influent Flowrates for the Soscol Water Recycling Facility in 2020

Wastewater Source	Annual Average Influent Flowrate (mgd)
Residential	7.31
Commercial/Industrial	1.55
Other Connections	0.701
Average Influent (2020) ***Average Influent (1998 to 2003)***	**9.56** ***8.83***

RECYCLED WATER PRODUCTION IN 2020

Using the 2020 average influent flowrate and a seasonal distribution of inflows from 1998 to 2002, representative monthly influent flowrates were determined. The monthly influent flowrates were then used to initiate a water balance of the Soscol WRF and determine the amount of recycled water that could be produced in 2020. Potential gains and losses were estimated using historical precipitation data and typical evaporative losses in the existing 344 acres of storage ponds and reservoirs. Based on the results of the water balance, potential recycled water production in 2020 was estimated to be 9,800 acre-ft per year.

RECYCLED WATER DEMAND

The District currently holds agreements with a number of landowners to supply recycled water for irrigation of turf grass, vineyards, and landscaping. Reclamation is also undertaken by the District on its own sites when needed for recycled water disposal. Potential, new recycled water users were identified through conversations with District staff, examination of recent aerial photos (GlobeXplorer, 2002), review of real estate parcel data and maps, distance from the proposed recycled water pipeline (within 0.25 miles), and previous requests for inclusion in the District's recycled water program. Existing recycled water users, as well as the irrigated areas that could be hooked-up to an expanded recycled water distribution system by 2020 are shown in **Table ES-3**.

Table ES-3. Summary of Existing and Potential Recycled Water Users

Type of Recycled Water Use	Existing Users (irrigated acres)	Potential Users (irrigated acres)	Total Users in 2020 (irrigated acres)
Landscape and Turf Grass Irrigation	383	617	1,000
Agricultural Irrigation			
Vineyards	446	7,545	7,991
Pasture	0	199	199
District Reclamation Sites			
Vineyards	10	0	10
Turf	43	213	256
Reclamation	693	-213	480
Total	**1,575**	**8,361**	**9,936**

Annual Napa area irrigation requirements for turf grass, pasture, and vineyards are presented in **Table ES-4**. Vineyards, the most prevalent agricultural crop, typically use very little water and only require irrigation during 4 months of the year.

Table ES-4. Annual Irrigation Requirements in the Napa Area

Type of Planting	Irrigation Water Requirement	Irrigation Months
Turf Grass	2.8 ft/yr	April-October
Pasture	2.5 ft/yr	April-October
Vineyards	0.25 ft/yr	June-September

The total irrigation demand for recycled water in 2020 was determined by applying the irrigation requirements to the potential user acreages. The total 2020 irrigation demand was calculated to be 7,360 acre-ft per year.

Several types of industrial users have been targeted for future recycled water connections: cooling towers, equipment wash-down, gravel washing, fire fighting, and concrete production. For these industrial uses, a conservative value of 3 mgd (3,360) acre-ft per year) was used for planning purposes (based on discussions with power plant operators). Total 2020 recycled water demand was determined by combining the projected irrigation demand and the projected industrial demand. This value was estimated to be 10,700 acre-ft/year. The monthly distribution of the 2020 recycled water demand is presented in **Figure ES-1.**

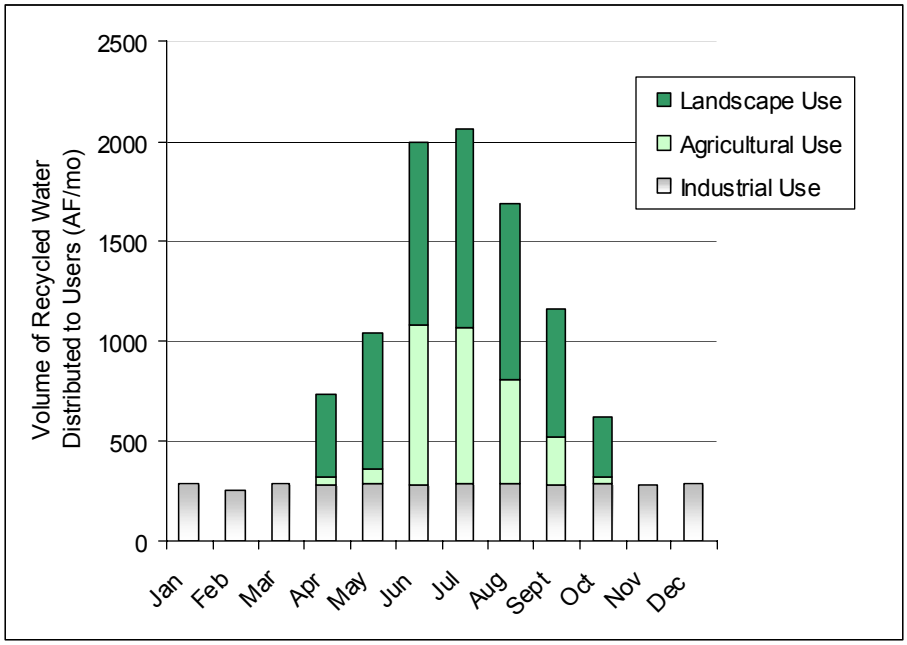


Figure ES-1. Potential Recycled Water Use by Month in 2020

The existing irrigation sites, as well as the recycled water use sites identified for 2020, are shown in **Figure ES-2** on the following page. The boundaries of the Los Carneros Water District (LCWD) are delineated in **Figure ES-2**. LCWD was formed primarily to facilitate the delivery of recycled water to agricultural users in the South Los Carneros area. Including all identified users, the total demand of 10,700 acre-ft/year is actually greater than the 2020 estimated recycled water production value of 9,800 acre-ft/year.

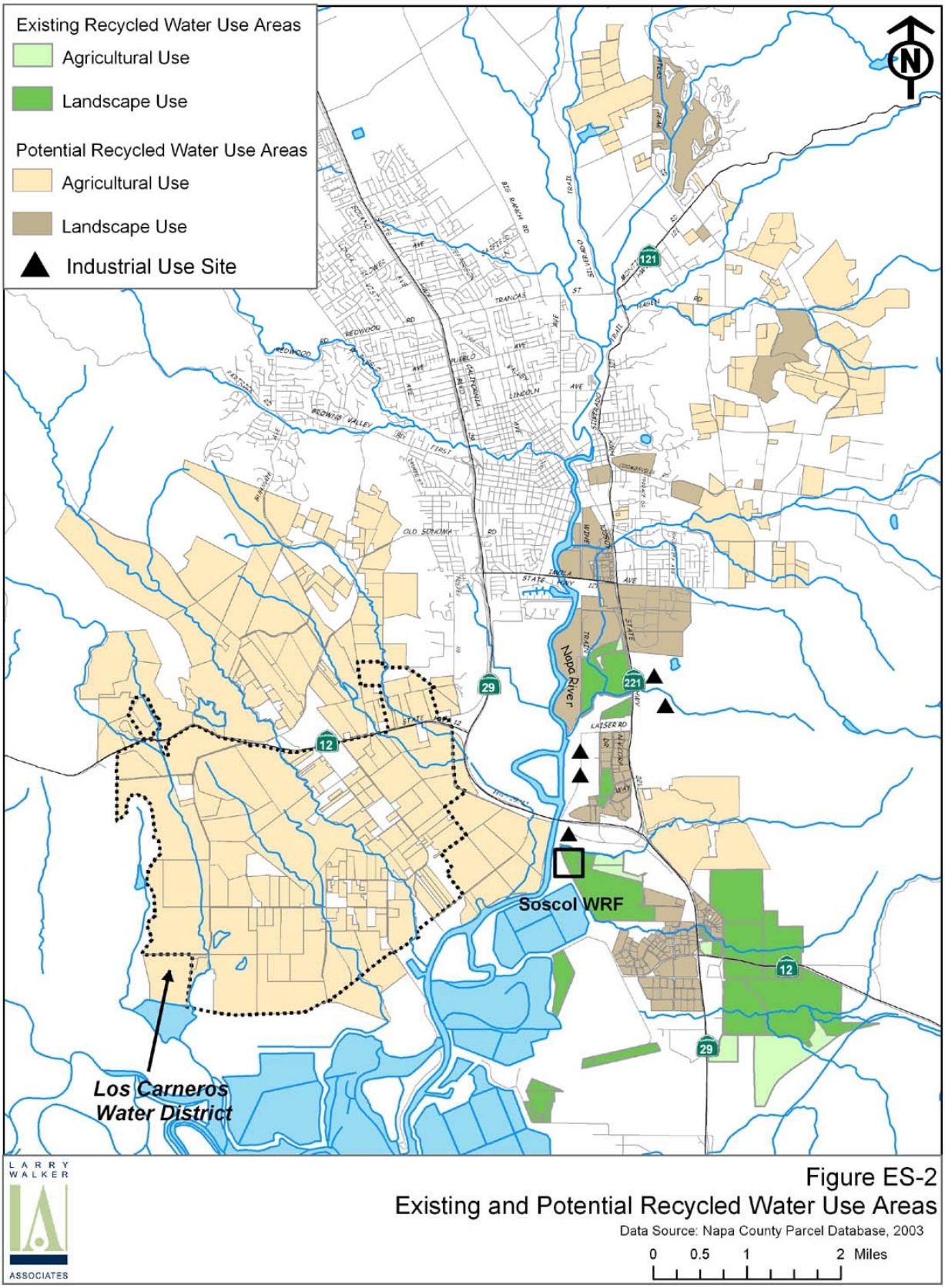

Existing Recycled Water Use Areas
Agricultural Use
Landscape Use
Potential Recycled Water Use Areas
Agricultural Use
Landscape Use
Industrial Use Site
N
Napa River
Soscol WRF
Los Carneros
Water District
29
12
121
221
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Figure ES-2
Existing and Potential Recycled Water Use Areas
Data Source: Napa County Parcel Database, 2003
0 0.5 1 2 Miles

RECYCLED WATER STRATEGIES

Seven recycled water distribution strategies were developed to represent the range of interests relevant to the District. The strategies and their key components are described in **Table ES-5**.

Table ES-5. Summary of Recycled Water Strategies Evaluated

Strategy No. - Title	Description
1- Recycle All Water Produced	• Treat all influent wastewater to recycle water standards • Store all water produced • Distribute water through pipelines to landscape, agricultural, and industrial users
2- Recycle Enough to Meet NPDES Permit Requirements	• Deliver recycled water to sufficient recycled water users during the dry season in order to reliably meet the dry weather discharge prohibition
3- Maximize Use of Existing Storage (Optimize Largest Users)	• Maximize use of existing storage facilities (have water available in ponds at beginning of irrigation season and empty ponds prior to start of river discharge season) • Minimize volume of treated effluent discharged to the Napa River • Deliver recycled water to the largest users • Maximize the number of paying customers
4- Maximize Use of Existing Storage (Least Pipeline Cost)	• Maximize use of existing storage facilities (as in Strategy 3) • Minimize the capital outlay for pipeline construction
5- Deliver Recycled Water to MST Area	• Deliver recycled water to the Milliken-Sarco-Tulucay area as quickly as possible • Provide recycled water, primarily for golf course and vineyard irrigation, to reduce the groundwater deficit in the area
6- Deliver Recycled Water to the Carneros Area	• Deliver recycled water to the Carneros area as quickly as possible • Provide recycled water for agricultural irrigation to improve water supply conditions in the area
7- Maximize Use of Existing Storage (Augment Water Supply)	• Maximize use of existing storage facilities (as in Strategies No. 3 and 4) • Focus on augmenting water supply in water-short areas of Napa County • Maximize the volume of recycled water delivered to both the MST and Carneros areas.

EVALUATION OF RECYCLED WATER STRATEGIES

Each of the seven recycled water strategies has a different focus and achieves different goals for the District. Some of these achievements can be quantified; such as the reduction in river discharge, volume of recycled water supplied to water-short areas, construction costs, and operations and maintenance (O&M) costs. Many of the benefits realized by implementation of a particular recycled water strategy cannot be quantified. A comparison of the recycled water strategies was completed based on quantifiable data, as well as a comparison of the intangible benefits associated with the projects. A list of the values and data used to evaluate the distribution strategies is presented in **Table ES-6**. The metric comparison of distribution strategies is presented as **Table ES-7** on the following page.

Table ES-6. List of Benefits Used to Evaluate Potential Recycled Water Distribution Strategies

Quantifiable Benefits	Intangible Benefits
• Low Capital Costs • Low O&M Costs • Augment Supply in Water-Short Areas • Reduction in River Discharge • Large Volume of Recycled Water Distributed	• Acceptance by Outside Stakeholders • Helps Environment • Rapid Implementation • Simple Implementation

The strategies and evaluation criteria were presented to the District Board of Directors in February, 2005. The Board was asked to review the results and identify a preferred strategy for 2020. The Board indicated that costs to sewer customers is paramount and must factor heavily into any recycled water planning efforts. However, the Board also indicated an interest in augmenting water supply in the community. Embracing these two priorities, the Board expressed a desire to certainly implement Strategy No. 2, but as funding opportunities become available, Strategy No. 3 would be implemented in stages. Since Strategy No. 2 is effectively a subset of Strategy No. 3, Strategy No. 3 was identified for development of an implementation plan.

Table ES-7. Metric Comparison of Recycled Water Strategies

	Strategy No. and *Primary Goals*						
Criteria	**No. 1** *Recycle all effluent produced*	**No. 2** *Recycle enough to meet permit requirements*	**No. 3** *Maximize use of existing storage, deliver water to largest users*	**No. 4** *Maximize use of existing storage, least pipeline cost*	**No. 5** *Deliver water quickly to the MST area*	**No. 6** *Deliver water quickly to the Carneros area*	**No. 7** *Maximize use of existing storage, augment water supply*
Total Volume of Recycled Water Delivered (acre-ft/yr)	9,800	3,590	4,540	4,280	3,780	3,780	4,260
Total Volume of Recycled Water Provided to Water-Short Areas (acre-ft/yr)	2,110 (Carneros) 420 (MST)	0	730 (Carneros) 420 (MST)	2,040 (Carneros)	420 (MST)	590 (Carneros)	1,400 (Carneros) 420 (MST)
Total Volume of Effluent Discharged to the Napa River (acre-ft/yr) [mgal/yr]	0	6,200 [2,020]	5,260 [1,710]	5,520 [1,800]	6,010 [1,960]	6,010 [1,960]	5,520 [1,800]
Total Capital Costs ($, million)	91.8	1.91	64.0	34.9	30.9	16.3	62.9
Additional O&M Costs ($/yr)	3,040,000	39,400	424,000	431,000	157,000	134,000	482,000

RECOMMENDED RECYCLED WATER STRATEGY

The recycled water distribution system specified for Strategy No. 3 is shown in **Figure ES-3** on the following page. Strategy No. 3 would be implemented in phases according to defined areas of service and the availability of funding assistance. The proposed construction phases/projects are presented in **Table ES-8** along with the estimated construction costs. The construction phases are also shown in **Figure ES-3**. The dates listed in **Table ES-8** are approximate and subject to change based on when funding becomes available.

Table ES-8. Phased Implementation of Strategy No. 3

Phase	Construction Project	Construction Dates[1] (approximate)	Construction Costs[2] (millions, $)
1	User Hook-up to the Existing Recycled Water Pipeline - *Strategy No. 2* (as parcels are developed and infrastructure is provided)	2006 to 2020	1.91
2E	Recycled Water Delivery to the MST Area (pipe segments 22,24,28, 29,30,31,32)	2006 to 2010	30.8
2W	Recycled Water Delivery to South Los Carneros (pipe segments 1,2,3,4,6,7,8,9a,11)	2006 to 2010	17.6
3	Recycled Water Delivery to Downtown Napa and Silverado (pipe segments 21,25,27,33,34)	2015 to 2020	13.8
Total			**64.1**

[1]Actual construction dates will be determined by funding availability.
[2]Capital costs are presented in July, 2005 dollars for comparison purposes only (ENR = 8,392)

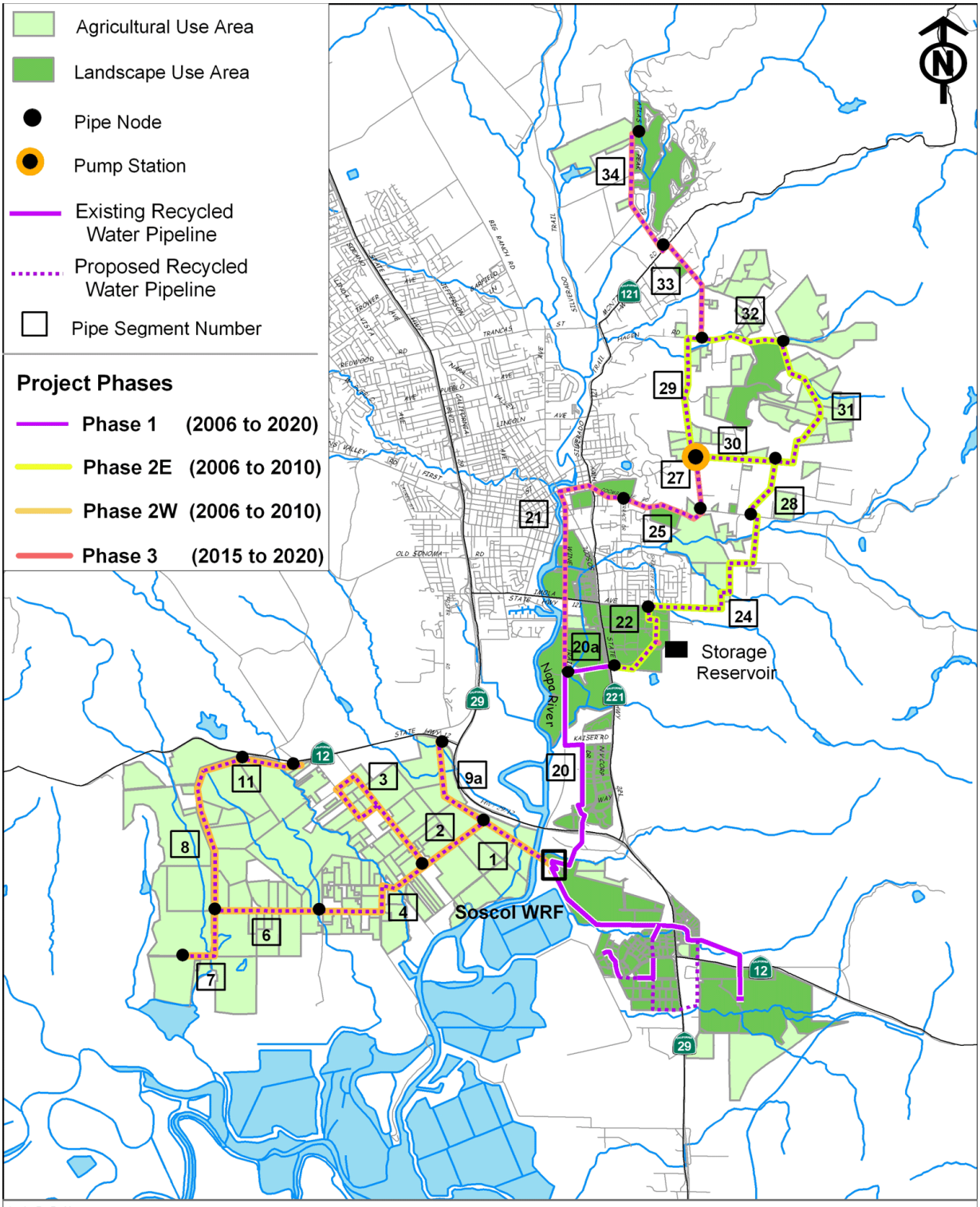

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Figure ES-3
Phased Implementation of Strategy No. 3
Data Source: Napa County Parcel Database, 2003
0 0.5 1 2 Miles